

During the period 1902 Oct.–Dec. the observers at Oxford have several times noted an unusually crystalline image of  $\alpha$  Orionis. The star *Capella* has generally been observed by the writer to be about one magnitude brighter than *Rigel*. Allowing for the effect of atmospheric absorption, a difference exists of about 0.6 or 0.7, which is sensibly greater than that given in the Harvard Photometry, viz. 0.14. Within small limits these two comparison stars are probably variable, as suggested by W. Struve and Argelander respectively, and by others.

It will be seen in the preceding table that between 1901 March 9 and 1902 October 22 the photographic magnitude of  $\alpha$  Orionis had increased, but only slightly. Since October 22, however, a gradual decline appears to have set in. The evidence afforded by the visual estimates, and by the remarks appended to them, also confirms not only the brightening between the two first dates, but the slight decrease which appears to have taken place subsequently.

*Radcliffe Observatory, Oxford:*  
1902 Dec. 10.

### *Cape Double Star Results, 1902.* By R. T. A. Innes.

(Communicated by Sir David Gill, K.C.B., F.R.S., H.M. Astronomer.)

The winter was a very wet one, so that very few nights were available for double-star work. Through leave of absence, observations ceased early in August. All the measures were made with the Repsold micrometer on the 18-inch refractor. In the cases of a few newly discovered pairs estimates only have been secured: these were generally made at the 7-inch refractor.

A few measures previously omitted are included.

The measures of  $\alpha$  Centauri will be found on p. 81.

The screw-value used in 1902 is 17".600.

The colour scale used and the general arrangement of the results are as in 1901. See *Monthly Notices*, vol. lxii. pp. 470–484.

Incidentally it was found that the star G.P.Z. 7641, mag. 8.7, occupies the centre of a round nebula of about 3' diameter, and it is therefore a nebulous star. Its position is:

	h	m	s	°	'
1860	11	5	32	—75	51.2
1875	11	6	1	—75	56.3
1900	11	6	49	—76	4.4

Mag. in the C.P.D. = 8.6.

Dec. 1902.

Star Results, 1902.

77

The nebula  $h\ 3413 = \text{N.G.C. } 4976$  is identical with C.P.D.  $-48^\circ$ , No. 5305, (1860)  $13^h\ 0^m\ 38^s - 48^\circ\ 45' \cdot 4$ .

Star.	Mag.	R.A. 1900. S. Dec.	Pos. Angle.	Dist.	Diff. of Mags.	Colours A.B.	No of Nights.	Remarks.
Innes 27	... 7.3	<sup>h</sup> 1 <sup>m</sup> 12 <sup>s</sup> 69 <sup>'</sup> 21	15 208°0	0.96	0.6	...	1	
$\kappa$ Toucani	... 4.9	1 12 69 24	15 352.8	5.00	...	3, --	1	1
Cape 27	... 7.9	2 33 88 50	... 204.9	...	...	...	2	2
Innes 386	... 7.2	2 37 59 59	15 143.5	0.3 ±	0.2	0, 0	1	
Lac. 912	... 6.7	2 49 41 48	15 295 ±	15 ±	6.8	...	1	3
Innes 150	... 8.2	3 16 63 26	14 358.0	3.93	2.5	...	1	22
C.P.D. 357	... 9.0	3 42 40 29	14 211.4	3.78	1.1	...	1	4
$h\ 3641$	... 5.3	4 13 62 27	15 253.8	8.43	4.0	4, $b$	2	
C.Z. 4 <sup>h</sup> 727	... 7.8	4 23 24 41	2 330 ±	0.7 ±	0.5	...	1	5
$\kappa$ Pictoris	... 6.4	5 21 56 15	0 60 ±	0.5 ±	0.1	...	1	6
Innes 349	... 7.0	6 11 29 34	30 45.1	5.90	...	...	1	
Cape 23	... 8.5	6 12 49 5	30 63.5	5.32	...	4, $b$	1	
$h\ 3845$	... 7.0	6 13 22 40	30 20.1	35.1	...	2, --	1	
G.P.Z. 3956	... 9.4	6 19 73 26	1 260 ±	2 ±	1.0	...	1	7
$\beta\ 754$	... 7.0	6 31 33 56	30 33.3	1.09	0.1	2, 2	1	
Dunlop 31	... 5.0	6 36 48 8	30 319.4	12.9	...	4, $b$	1	
Innes 65	... 6.3	6 54 35 23	30 207.6	...	...	...	1	8
„ 183	... 7.5	6 57 25 30	16 147.0	3.35	2.4	1, 5	2	
„ 184	... 8.0	7 8 60 25	21 179.1	poor	...	...	1	
Hargrave 9	... 7.5	7 8 56 12	01 219.9	1.42	1.0	...	1	
Lalande	... 4.9	7 12 23 8	36 60.6	27.3	...	...	2	9
Cordoba [71]	7.7	7 31 66 58	11 192.3	3.66	...	4, $b$	2	
Innes 285	... 8.8	7 35 48 27	35 138.5	1.04	1.0	...	1	
$d_2$ Puppis	... 5.9	7 36 37 55	35 150.7	1.59	...	...	1	10
Innes 353	... 7.4	7 36 43 3	32 214.5	0.91	0.4	0, 0	2	
„ 185	... 9.5	7 37 29 53	32 195.7	1.81	0.6	...	2	
„ 354	... 7.5	7 39 42 20	35 124.9	1.14	1.6	...	1	
$\zeta$ Volantis	... 3.8	7 43 72 22	01 116.0	17.1	...	...	1	
Innes 161	... 5.3	7 44 38 16	35 83.6	10.5	4.0	...	1	
Cape 20	... 8.5	7 45 44 18	35 87.2	3.08	1.2	...	1	
$b$ Puppis	... 4.7	7 49 38 36	35 nil	...	...	...	1	36
Innes 163	... 8.2	7 57 40 18	35 119.4	0.78	2.5	...	1	
„ 187	... 9.2	7 58 34 12	26 12.9	3.53	2.7	...	2	
„ 188	... 9.3	7 59 34 17	08 339.1	2.92	0.3	0, 0	2	
„ 164	... 7.5	8 3 39 49	27 77.2	0.64	1.0	3, 3	1	

Star.	Mag.	1900.		Pos.	Dist.	Diff.	Colours	No.	Remarks.
		R.A.	S. Dec.	1902' ±	Angle.	of Mags.	A.B.	of Nights.	
Innes 191 ...	8.7	h m ° '							
		8 5 41 37		35 199.8	0.99	0.7	...	1	
„ 166 A-B	9.0	8 11 52 4		16 239.9	2.16	2.0	...	1	
„ „ A-C				„ 277.2	8.40	3.0	...	1	
Corboba (76)	8.2	8 13 34 33		26 148.2	2.02	0.5	...	1 11	
Innes 9 ...	6.8	8 16 73 30		36 308.9	0.78	0.1	2, 2	1 12	
„ 194 ...	9.0	8 17 59 53		36 132.7	1.33	1.0	3, b	1	
„ 393 ...	6.5	8 19 26 2		26 221.8	3.26	7.5	3, —	2	
B Velorum ...	4.8	8 19 48 10		36 141.4	0.89	1.5	...	1	
Brisb. 2035...	7.5	8 24 40 55		26 107.1	6.15	2.5	...	2	
Innes 394 ...	8.0	8 26 38 16		36 189.4	0.70	0.7	...	1	
„ 313 ...	7.2	8 27 41 11		36 216.2	3.79	2.0	4, B	1	
„ 168 ...	6.9	8 27 44 24		36 79.0	3.34	3.5	...	2	
h 4106 ...	7.8	8 28 36 21		26 146.0	6.30	2.0	3.5, b	2 13	
h 4107 ...	6.6	8 28 38 44		26 328.9	4.36	...	2, b	2	
Innes 11 ...	6.5	9 12 45 8		27 269.9	0.94	1.5	2, 2	1 14	
„ 12 ...	5.4	9 18 74 28		25 259.4	0.3 ±	...	...	1 15	
ψ Argûs ...	3.5	9 27 40 2		21 338.8	0.48	...	...	4-1 16	
C.Z. 9 <sup>h</sup> 2351	8.8	9 30 43 52		26 169.7	4.46	0.1	...	2 17	
Innes 350 ...	8.0	9 34 67 46		18 179.2	1.68	...	...	2	
λ 115 ...	5.5	9 34 53 13		21 168.4	0.78	...	3, 3	3	
Innes 360 ...	8.9	9 34 66 50		12 184.4	5.16	...	2, b	1	
„ 202 ...	7.0	9 35 39 10		31 175.3	1.09	2.0	2, b	1	
„ 203 ...	8.2	9 36 62 6		25 314.3	0.3 ±	...	...	1 18	
„ 320 ...	8.6	9 36 66 15		12 47.9	1.09	...	...	1	
Rumker 12 ...	6.7	9 53 68 43		36 213.0	9.46	1.5	...	1	
φ Argûs ...	3.7	9 53 54 6		40 9.0	37.3	...	...	1	
Innes 322 ...	9.0	9 55 62 5		40 66.2	1.87	1.0	...	1	
„ 290 ...	9.2	9 59 59 36		44 284.3	1.14	1.0	...	1 19	
C.P.D. 1699	9.6	9 59 59 28		42 92.5	5.26	0.1	...	2 19	
„ 1718	9.2	9 59 59 31		42 274.2	2.27	1.5	...	2 19	
Innes 291 ...	7.2	9 59 70 15		38 321.3	1.07	2.5	2, b	2	
„ 292 ...	7.3	10 0 27 54		40 210.4	0.66	0.3	3, —	1	
„ 293 ...	6.9	10 1 27 43		40 327.5	0.54	...	...	1	
„ 173 ...	5.2	10 2 46 53		31 53.7	0.57	2.8	3, —	1	
„ 13 A-B	6.4	10 7 68 12		47 326.3	0.75	0.1	3, 3	2	
„ AB-C				50 40.3	25.8	...	...	1 20	
„ 361 ...	8.5	10 9 46 59		30 135.4	4.77	2.0	3, —	2	

Dec. 1902

## Star Results, 1902.

79

Star.	Mag.	R.A. 1900.		S. Dec.	1902' ±	Pos. Angle.	Dist.	Diff. of Mags.	Colours A.B.	No. of Nights.	Remarks.
		h m	° ' "			°	"				
Russell 139...	7.2	10 12	66 47	45	333.5	2.12	1.8	4, b	1		
C.Z. 10 <sup>h</sup> 889	8.7	10 13	41 1	38	338.8	2.69	0.7	y, b	2	21	
Innes 206 ...	8.5	10 14	22 40	26	328.0	1.01	...	...	2		
„ 207 ...	8.5	10 14	32 43	43	322.4	2.27	0.3	...	2		
Russell 141...	7.7	10 17	66 40	47	45.8	1.93	1.2	y, b	2		
Innes 208 A-B	7.5	10 20	43 44	47	26.5	0.78	1.1	...	2		
„ „ AB-C				50	22.0	24.2	6.5	...	1		
„ 209 A-B	7.5	10 20	38 4	47	137.0	0.77	0.1	2, 2	2		
„ „ AB-C				50	126 ±	20 ±	7.5	...	1		
„ 210 ...	7.7	10 23	38 12	47	236.1	0.95	2.5	...	2	22	
„ 73 ...	7.2	10 25	48 29	14	221.4	5.31	...	2, b	2	23	
„ 174 ...	8.4	10 28	61 4	...	50.3	1.00	2.0	...	2	24	
„ „ ...				46	46.0	0.98	1.5	...	2		
„ 32 ...	9.0	10 28	61 17	45	343.9	4.98	2.0	...	1		
Cordoba (24)	7.4	10 31	57 10	28	238.4	5.17	2.3	4.5, B	2	25	
Innes 74 ...	8.5	10 32	63 37	28	231.7	2.96	1.4	—, r	2		
„ 175 ...	7.7	10 32	47 20	28	156.5	1.93	3.2	...	2		
C.Z. 10 <sup>h</sup> , 2403 A-B	9.0	10 34	64 51	28	14.3	0.59	0.1	...	2	26	
„ AB-C				28	6.1	5.07	0.2	...	2		
Innes 397 ...	8.7	10 40	36 21	25	352.1	1.24	1.0	...	1		
„ 398 ...	8.8	10 42	56 48	34	235.2	4.52	...	...	2		
δ <sub>1</sub> Chameleontis ...	5.5	10 44	79 56	28	60.0	0.69	0.3	4, 4	2		
h 4373 ...	8.9	10 44	40 55	47	344.5	11.0	0.5	...	1		
Bris. 3273 ...	8.5	10 49	62 33	38	203.3	2.33	0.2	4, 4	2	27	
Russell 164...	7.0	10 55	60 47	44	81.7	3.78	3.5	3, —	1		
Innes 212 ...	7.0	10 58	81 1	31	151.3	0.73	...	...	1		
C. G. A. 166 (x Carin.)...	9.7	11 3	58 10	34	221.3	2.85	2.0	...	2	28	
Innes 213 ...	8.0	11 6	32 1	36	125.9	0.82	2.5	...	1		
h 4421 ...	6.8	11 11	47 22	40	67.4	23.0	3.3	...	2	29	
C.P.D. 2224	9.6	11 17	61 29	48	34.5	1.11	0.5	...	1	30	
Innes 76 ...	9.5	11 22	30 11	33	50.5	7.06	0.5	...	1		
Lac. 4834 ...	7.7	11 33	60 56	51	117.7	1.32	2.7	...	2	31	
„ 4829 A-B	7.2	11 34	62 49	54	94.1	0.53	0.0	3, 3	3	31a	
„ „AB-C				54	359.6	1.66	3.0	...	3		
„ „AB-D				56	323.2	9.48	5.0	...	2		

Star.	Mag.	R.A. 1900.		S. Dec.	1902' ±	Pos. Angle.	Dist.	Diff. of Mags.	Colours A,B.	No. of Nights.	Remarks.
		h	m	°	'						
<i>h</i> 4460	... 7.5	11	34	57	11	41	176.3	8.58	1.3	...	2
Howe 17	... 6.9	11	49	37	12	16	277.7	2.05	...	...	1
Washburn 115	8.3	11	59	57	11	44	244.8	1.84	1.5	...	2
<i>h</i> 4498	... 5.9	12	1	65	9	44	61.6	8.75	...	3, B	2
Jacob [8]	... 6.4	12	5	34	9	53	19.8	3.15	2.0	...	1 32
Lac. 5049	... 7.0	12	6	44	52	36	170.8	2.34	2.8	4, B	2 33
<i>h</i> 4507	... 8.1	12	8	44	20	45	223.4	16.3	...	4½, B	2
Innes 81	... 9.0	12	10	29	13	36	344.0	2.71	...	...	1 34
λ 154	... 5.1	12	21	50	54	55	284.8	22.5	8.4	3, —	1 35
Innes 35	... 8.5	12	21	76	7	31	315.3	2.37	...	...	1
Cape 12	... 7.0	12	23	61	12	39	260.1	2.09	0.8	4, 2	2
Lac. [5169]	... 6.2	12	23	55	51	55	290.5	49.2	5.8	4, —	1
Innes 36	... 7.7	12	23	61	19	40	325.3	21.8	4.8	...	2
„ 218	... 7.3	12	24	37	25	28	234.5	2.34	2.5	3, <i>b</i>	2
„ 309	... 7.7	12	26	77	39	31	nil	...	...	...	1
„ 82	... 7.9	12	26	40	57	28	353.7	0.80	1.0	...	2 37
„ 219	... 8.5	12	26	55	34	26	50.0	1.64	1.0	...	2 38
„ 296	... 6.7	12	33	74	49	42	274.3	1.84	2.3	2, <i>b</i>	2 39
γ Centauri											
A—B	2.4	12	36	48	25	36	355.7	1.54	...	...	2
„ AB—C						36	117.5	39.5	11.6	...	2 40
Innes 324	... 8.5	12	37	83	7	33	279.2	3.89	0.8	...	2
<i>h</i> 4544	... 9.0	12	39	78	55	44	298.8	3.05	2.5	3, B	2
β Muscæ	... 3.3	12	40	67	37	39	344.5	1.16	0.1	3, 3	2
β Crucis	... 1.7	12	42	59	8	43	322.3	44.4	...	...	2
ι Octantis	... 6.3	12	44	84	35	55	nil	...	...	...	1
Lac. 5299	... 6.7	12	47	53	17	55	211.8	7.01	4.0	4, <i>b</i>	1 41
Innes 83	... 7.0	12	51	47	9	37	277.2	0.54	0.1	3, 3	2 42
„ 363	... 8.5	12	55	67	19	33	194.2	2.62	1.3	...	2 22
C.Z. 12 <sup>h</sup> 3298	8.5	12	57	59	4	44	356.0	3.56	0.1	...	2
λ 168	... 7.5	12	58	38	26	35	nil	...	...	...	1
Ref. Cat. 14											
A—B	4.7	13	6	59	23	53	345.5	1.55	3.2	...	2 43
C.P.D. 6088	8.3	13	7	40	13	44	236.2	2.26	0.5	...	2 44
Lac. 5456	... 6.8	13	11	67	58	50	214.0	0.47	0.7	1, 1	4 41
C.Z. 13 <sup>h</sup> 629	8.7	13	12	40	1	53	320.3	1.05	1.5	0, 0	2 45
Innes 220	... 7.7	13	19	34	7	44	6.6	0.63	1.5	3, 3	2
Cape 32	... 8.4	13	20	52	46	53	263.1	4.08	1.0	...	1

Dec. 1902.

## Star Results, 1902.

81

Star.	Mag.	1900.		S. Dec.	Pos.		Dist.	Diff. of Mags.	Colours A.B.	No. of Nights.	Remarks.
		h	m		1902° ±	Angle.					
Innes 298 ...	7.2	13	25	68° 43'	36	205° 3'	0.75	1.7	4, 4	2	
„ 365 ...	6.5	13	30	61 11	46	214° 3'	0.39	0.2	3.3, 3.3	3	46
„ 221 ...	7.2	13	31	31 54	54	167° 7'	0.56	1.5	...	2	
λ 183 ...	8.0	13	32	31 51	53	Looks	single	...	...	1	
Innes 401 ...	8.5	13	49	42 5	29	232° 0'	0.41	0.1	3, 3	2-1	
„ 225 ...	7.2	13	54	62 28	26	299° 8'	...	...	...	1	
„ 325 A-C	8.7	14	11	68 10	55	43° 9'	44.8	...	...	1	47
„ „ B-C					55	222° 5'	7.98	...	...	1	
Russell 244 ...	6.5	14	16	47 52	40	123° 4'	4.01	2.8	3, B	2	48
Y <sub>3</sub> 6052 ...	7.3	14	19	27 41	54	282° 7'	0.60	1.2	4½, 4½	2	
τ <sub>2</sub> Lupi ...	4.4	14	20	44 56	55	176° 7'	0.30	...	...	3	49
Cordoba (35)	8.2	14	21	23 46	54	133° 6'	2.31	1.3	2, b	2	
P. 14 <sup>h</sup> 87 ...	5.6	14	24	44 52	58	309° 9'	10.4	4.4	...	1	50
β 1112 ...	6.0	14	27	30 16	56	6 0	2.36	3.0	4, b	2	
Lac. 5985 ...	7.0	14	27	32 53	54	158° 7'	14.2	4.0	4, B	2	41
h 4685 ...	9.0	14	28	45 43	37	80° 0'	2.40	0.8	—, b	2	22
h 4687 ...	7.7	14	29	36 6	57	91° 2'	1.54	0.1	...	2	51
α Lupi ...	5.4	14	31	45 42	50	25° 2'	19.2	...	4.2, B	2	
α Centauri ...	0.2	14	33	60 25	11	211° 1'	...	...	...	1	87
					13	211° 2'	21.63	...	...	4	88
					31	211° 3'	21.66	...	3, 2	5	89
Innes 236 ...	5.6	14	43	72 47	52	101° 6'	1.82	2.0	3½, b	2	
h 4707 ...	7.7	14	46	66 0	53	118° 6'	0.58	0.3	3, 3	1	
Innes 226 ...	7.0	14	48	33 44	41	218° 4'	2.55	4.2	...	2	52
G.P.Z. 10498	8.8	14	49	70 32	52	347° 3'	2.03	1.6	...	2	53
Innes 328 ...	9.0	14	49	84 46	52	175° 6'	2.11	0.8	...	2	
„ 227 ...	7.3	14	50	34 14	41	89° 8'	0.40	0.3	3, 3	2	
„ 85 ...	8.5	14	59	35 32	55	182° 8'	0.80	0.9	...	2	
C.Z. 14 <sup>h</sup> 3790	8.3	15	1	42 43	51	182° 3'	1.89	0.2	2, 2	2	54
λ Lupi ...	4.3	15	2	44 54	56	193° 4'	0.61	0.3	2, 2	2	
Innes 238 ...	8.2	15	5	44 38	45	140° 4'	2.93	2.7	...	2	55
Lac. 6259 ...	6.3	15	9	60 34	31	317° 6'	10.7	...	...	1	56
h 4750 ...	7.3	15	9	47 40	38	19° 9'	13.3	3.0	...	1	
C.P.D. 5889	8.2	15	10	60 0	52	341° 6'	3.29	0.8	0, 0	3	57
Innes 370 ...	5.4	15	11	60 8	52	116° 8'	5.07	7.6	2, —	3	
„ 332 ...	6.6	15	12	67 7	53	107° 2'	1.21	2.0	3, —	1	
μ Lupi ...	4.2	15	12	47 30	45	155° 1'	1.50	0.0	3, 3	2	

Star.	Mag.	R.A. 1900.		S. Dec.	1902 $\pm$	Pos. Angle.	Dist.	Diff. of Mags.	Colours A.B.	No. of Nights.	Remarks.
Innes 371	... 8.9	h	m	58 30	53	292.3	0.78	1.0	...	1	
Sellers 20	... 8.5	15	16	47 33	50	215.2	1.15	0.4	3, 3	3	58
Innes 87	... 9.2	15	19	38 24	31	245.2	1.20	0.2	3, 3	1	59
„ 239	... 7.0	15	23	31 8	32	356.4	0.48	0.4	0, 0	2	
„ 240	... 7.2	15	27	64 47	33	189.1	2.40	3.0	4, B	4	60
„ 241	... 8.0	15	28	64 12	36	19.1	9.94	4.0	...	1	61
$\gamma$ Lupi	... 3.0	15	28	40 50	32	88.0	0.68	...	...	2	
Innes 89	... 6.8	15	34	39 39	33	148.6	1.31	1.0	...	1	
$\epsilon_1$ Normæ	... 4.8	15	55	57 30	51	231.8	0.52	...	3, 3	1	62
$\lambda$ 259	... 7.1	15	56	36 28	51	single	...	...	...	1	
Cordoba (43)	8.0	15	56	37 46	35	140.4	4.75	0.3	...	2	
$h$ 4828	... 8.5	15	58	43 4	48	92.2	8.27	...	...	1	
Harvard	... 6.4	15	58	37 35	33	146.3	40.0	6.6	...	1	
Ref. Cat. 16 <sup>h</sup> 6						Is same as No. 5		...	...		
$\lambda$ 266	... 7.2	16	3	35 23	51	single	...	...	...	1	
$\delta$ Tri. Aust.	... 4.0	16	6	63 26	51	„	...	...	...	1	63
$\lambda$ 269	... 6.8	16	10	52 50	51	„	...	...	...	1	
Innes 15	... 7.0	16	11	64 24	40	315.2	1.01	2.5	...	2	22
$\lambda$ Normæ	... 5.6	16	12	42 26	51	162.5	0.42	1.0	2, 2	1	64
$\lambda$ 272	... 6.7	16	13	35 15	51	278.0	0.40	0.0	4, 4	1	
Ref. Cat. 16 <sup>h</sup> 26	7.3	16	13	39 15	51	single	...	...	...	1	
$\lambda$ 273	... 7.5	16	13	39 23	51	„	...	...	...	1	
Innes 91	... 6.3	16	14	39 11	50	295.4	10.7	2.9	...	2	
„ 93	... 7.7	16	19	47 49	51	287.6	0.95	2.5	...	1	65
„ 94	... 7.7	16	20	29 42	51	205.8	0.68	1.5	4, —	1	
„ 404	... 9.1	16	27	52 27	42	122.0	4.18	0.5	...	2	
Harvard	... 6.8	16	29	72 6	51	245.7	2.05	3.5	4, B	1	38
Innes 405	... 8.9	16	32	46 27	51	318.0	2.60	0.0	0, 0	1	
„ 97	... 8.5	16	34	48 34	43	single	...	...	...	2	
Lac. 6968	... 7.7	16	40	45 17	44	359.4	0.57	0.6	...	2	41
Innes 100	... 6.8	16	48	73 16	48	180.5	0.66	2.0	...	2	
„ 101	... 9.0	16	48	40 54	36	354.9	1.42	...	...	1	66
$\lambda$ 316	... 6.4	16	53	48 30	48	185.6	0.63	1.0	5, 5	2	67
Cordoba (48)	7.0	16	55	50 1	51	234.6	8.00	...	...	1	
Innes 406	... 8.7	17	1	41 49	41	96.2	1.90	0.0	...	2	
„ 407	... 7.1	17	1	41 29	41	186.2	0.76	0.6	2, 2	2	
„ 246	... 7.5	17	4	27 39	49	33.5	1.29	3.2	2, —	3	
Cape 34	... 8.7	17	5	41 52	56	33.1	7.39	3.7	...	2	

Dec. 1902.

## Star Results, 1902.

83

Star.	Mag.	R.A. 1900.			S. Dec.	1902'±	Pos. Angle.	Dist.	Diff. of Mags.	Colours A.B.	No. of Nights.	Remarks.
		h	m	s	'		°	"				
<i>h</i> 4926 A-B	7.0	17	8	39	39	60	335.2	14.3	...	...	1	68
A-C						60	209.8	17.1	3.0	...	1	
Innes 229 ...	8.5	17	8	39	32	53	237.4	4.44	...	6, B	2	
„ 104 ...	6.5	17	9	69	56	51	132.9	2.10	...	3, B	1	
„ 408 ...	7.1	17	9	42	14	38	167.9	1.83	2.0	3, <i>b</i>	2	
$\lambda$ 322 ...	6.9	17	9	33	37	40	351.7	...	...	...	1	69
Brisbane ...	5.5	17	11	46	32	38	79.2	2.21	3.5	4, B	2	
$\beta$ 416 = Mel.(4)	5.9	17	12	34	53	36	292.1	2.29	1.2	5, 5	3	
A-C						36	131.0	29.6	...	...	2	
C-D						33	48.7	35.5	D, 13 <sup>m</sup>	...	1	70
Innes 409 ...	8.8	17	12	39	40	33	37.2	5.12	2.0	...	1	
„ 410 ...	8.3	17	14	42	33	40	285.0	2.81	1.7	3, <i>b</i>	2	71
„ 385 A-B	7.5	17	16	59	7	51	167.7	0.44	1.5	...	1	72
AB-C						51	210.2	17.0	...	...	1	
$\gamma$ Aræ ...	3.4	17	17	56	17	60	329.0	18.1	7.1	...	1	73
<i>h</i> 4949 ...	5.3	17	19	45	45	43	262.1	2.61	1.0	2, 2	2	
Cape 29 ...	8.9	17	23	42	59	46	340.2	4.44	...	...	1	
Washburn 136	7.3	17	25	40	58	46	109.7	0.95	...	...	1	
Innes 247 ...	7.1	17	31	37	48	43	112.9	1.23	2.5	3, <i>b</i>	3	
„ 107 ...	8.9	17	33	32	18	33	137.9	1.60	0.3	...	1	
Lac. 7370 ...	6.9	17	35	56	58	40	108.9	1.14	2.0	...	1	{ 74, 14
„ 7387 ...	6.8	17	38	59	57	40	...	...	...	...	1	{ 75, 14
Cape 24 ...	8.6	17	41	45	0	48	330.0	3.94	...	...	2	
<i>h</i> 4978 ...	5.8	17	42	53	35	60	268.9	12.0	3.0	2, <i>b</i>	1	
<i>h</i> 4981 ...	9.0	17	42	50	15	57	17.9	2.25	0.2	0, 0	2	76
Innes 110 ...	7.5	17	52	47	46	37	126.6	1.54	2.0	3, B	2	77
Harvard ...	5.6	17	57	75	54	40	231.0	25.9	7.4	5, —	1	78
Lac. 7604 ...	7.7	18	7	50	20	51	144.9	0.34	0.4	2, 2	1	79
<i>h</i> 5033 ...	6.9	18	8	48	53	46	116.0	17.6	...	...	1	80
$\xi$ Pavonis ...	4.2	18	14	61	32	51	150.1	3.28	4.0	6, <i>b</i>	1	
Cordoba [51]	7.9	18	16	42	49	46	138.3	3.33	...	...	1	
C.Z. XVIII.												
1250 ...	8.7	18	22	46	22	51	39.8	1.76	0.0	...	1	81
$\delta_1$ Telescopii	5.1	18	24	45	59	51	single	...	...	...	1	
Hargrave(317)	7.1	18	56	45	51	55	284.2	1.45	...	...	1	82
$\zeta$ Sagittarii...	2.7	18	56	30	1	55	51.7	0.43	...	2, 2	1	
$\lambda$ 403 A-B	7.2	19	57	36	20	55	single	...	...	...	1	83



Star.	Mag.	1900.				1902' ±	Pos. Angle.	Dist.	Diff. of Mags.	Colours A.B.	No. of Nights.	Remarks.
		R.A.	S. Dec.	h	m	°	'					
<i>h</i> 5168 ...	7.0	20	1	30	1	55	79°9	18''8	3.0	5, —	1	
C.P.D. 9113...	8.5	20	16	35	59	53	133°0	2.82	2.0	...	2	84
Russell 321 ...	6.7	20	20	37	44	53	83°4	1.31	2.2	3, <i>b</i>	2	85
Innes 379 A—B	5.9	20	59	73	34	46	...	...	...	...	2	86
„ AB—C						51	134°4	8.40	8.1	...	1	
„ 258 ...	7.7	21	5	60	27	55	110°5	0.52	1.2	...	2	
„ 19 ...	7.0	21	41	65	58	51	339°8	1.24	1.2	...	1	
„ 381 ...	8.2	21	59	56	57	55	111°0	1.85	1.5	...	2	
„ 20 ...	6.8	22	11	63	19	51	339°3	0.55	0.6	...	1	
Cordoba (63)...	6.5	22	37	47	43	58	132°2	7.70	...	...	1	

*Remarks.*

No.

1. B is purplish.
2. Epoch, 1901.01, omitted last year by error.
3. Found on a triple chart plate and estimated as follows:—1898,  $280^\circ \pm 16'' \pm$  comp. about  $11^m$ . Also seen in the 18-in.; but the comp. was too faint to measure. The an. prop. mot. of the chief star is  $0''.092$  towards  $150^\circ 8$ . Innes 412.
4. Found in 1896 by Mr. W. H. Cox at the T. Circle. Cape 38.
5. Innes 413. Found with the 7-in. About  $25'$  S.f.  $\beta$  311.
6. Innes 414. This close pair was found with the 7-in. and confirmed with the 18-in. The p.m. is under  $0''.01$ .
7. Cape 39. Found by Mr. Cox at the Transit-Circle.
8. Not too sure.
9. Colours very fine.
10. Most difficult.
11. A  $12^m.5$  star at  $320^\circ \pm, 18'' \pm$ , several other faint stars near.
12. No third comp. seen.
13. Wrongly identified in Ref. Cat.; is C.Z. 8<sup>b</sup>, 2233.
14. The prop. mot. is very small.
15. P. M. =  $\alpha + 0^s.001, \delta - 0''.01$ .
16. Always most difficult, distance decreasing. Recent measures are:—

1897.1	256°1	0°56	See and Cogshall.
1899.3	275°0	0°72	Aitken.
1900.3	292°8	0°76	Cape.
1901.2	307°2	0°70	„
1902.2	338°8	0°48	„

17. New = Cape 40. Found by Mr. J. Power at the T. C. A  $13^m.5$  star,  $230^\circ \pm, 9'' \pm$  from A; is  $5'' \pm$  from B. The mag. of A is from the C.P.D., the Cor. DM. has  $9^m.5$ . My estimate was  $8^m.3$ .
18. Smaller component precedes. In 1901.09 I found this star to be single.
19. The star measured for Innes 290 on 1901.09 is C.P.D.— $59^\circ$ , 1718. C.P.D.— $59^\circ$ , 1699 and 1718 = Innes 415 and 416 were measured by accident for Innes 290. In a cluster containing many small pairs.
20. Distance on 1900.22:—for  $35''.1$  read  $26''.1$ , error of reduction.
21. Transit-Circle double star = Cape 41.
22. Colours slightly contrasted.

- No.
23. Another *comes* at 20'' (not 20', as in Ref. Cat.).
  24. Epoch 1901·18, omitted in 1901 list. Angle decreasing?
  25. Another *comes* 13½ mag., 235° ±, 15'' ±.
  26. A - B added with the 18-in. = Innes 417.
  27. New = Innes 418. Found with the 7-in. There is a faint wide pair N.f. The prop. mot. is uncertain, as the observations available are discordant.
  28. New = Innes 419. Found with the 7-in. This pair is in the magnificent cluster around  $\alpha$  Carinae, and is not fainter than 8<sup>m</sup>·5; but C.G.A. gives 9¼<sup>m</sup>, C.P.D. 9<sup>m</sup>·2. It is No. 483 of Gould's Cordoba Photographs of the cluster, but it is not identified; mag. there = 9·5.
  29. A 14<sup>m</sup> star, 10° ±, 28'' ±.
  30. Picked up with the 18-in = Innes 420. It is the following of two stars near the variable R. S. Centauri.
  31. New = Innes 421. Found with the 7-in. Many faint stars within 40''.
  - 31A. New quadruple star = Innes 422. C was found with the 7-in. The chief star was found to be double, and D added with the 18-in. The angles for A - B are discordant, viz. 89°·1, 101°·7, and 91°·5.
  32. Both components single.
  33. New = Innes 423. Found with the 7-in. The prop. mot. is very small.
  34. In 1901 angle to read 344°·0 and not 334°·0, as printed.
  35. The prop. mot. is 0''·083 towards 232°·9.
  36.  $\lambda$  89. No compn. seen. Is perhaps a misidentification of the star Ref. Cat. 7<sup>h</sup> No. 71.
  37. P.m. = 0''·09 towards 263°·7.
  38. The companion was not seen here in 1901.
  39. P.m. = 0''·21 towards 349°·3.
  40. Poor measures, as the faint star was difficult to see. See has 29''·8, which would seem to be too small by 10''.
  41. Found by Prof. Bailey at Arequipa and kindly communicated by Prof. E. C. Pickering.
  42. Prop. mot. = 0''·10 towards 270°. This star is called "double" in Brisbane, but unless there has been much change the present companion could not have been seen at Parramatta.
  43. Added with the 18-in. = Innes 424.  $\lambda$  170, See's comp. at 0''·34 was not seen, but the chief star had perhaps a very doubtful elongation towards 130°. Professor See did not observe the new *comes*; but it is a difficult object, on account of the disparity of magnitude, and could be very easily overlooked, as indeed it was by myself in 1901 when measuring the distant star noted at Arequipa in 1891.
  44. Transit-Circle pair = Cape 42.
  45. New = Innes 425. Found with the 18-in.
  46. Prop. mot. = 0''·19 towards 145°·7. Change of position-angle = 19° in two years.
  47. A 13th mag. star about midway between A and C.
  48. Prop. mot. = 0''·04 towards 257°·2.
  49. " = 0''·04 " 244°·0.
  50. " = 0''·077 " 270°·0. Found with the 18-in. = Innes 426.
  51. Angle increasing slowly; distance decreasing.
  52. The *comes* was not seen in 1901. A fainter star 30'' in same direction.
  53. New = Innes 427, found with the 18-in.
  54. New = Cape 43. Found at the Transit-Circle. Mag. from C.P.D. Cor. DM. has 9<sup>m</sup>·0, which is too faint. A 12<sup>m</sup> star is S.f. Prop. motion of the chief star = 0''·06 towards 190°·0.
  55. Prop. mot. = 0''·03 towards 288°·0. There is an 11<sup>m</sup>·5, 310° ±, 20'' ±.
  56. This was also measured in 1901 for  $\delta$  Circini. The Arequipa *comes* to the latter star was estimated 12<sup>m</sup>, 270° ±, 50'' ±, when the former was measured. Lac. 6259 = Innes 428.

- No.  
 57. Found by Mr. W. H. Cox at the T.-C. = Cape 44.  
 58. Large common prop. mot. of  $0''.47$ , but relatively fixed.  
 59. This star has been elsewhere misidentified and measured as  $\lambda$  236.  
 60. Perhaps the chief star is elongated towards  $232^\circ$ .  
 61. This is the only near companion.  
 62. Is  $\lambda$  258. This fine pair has decreased in angle  $35^\circ$  since 1897.  
 63. The Arequipa comes  $20''$  S.f. seen. I would suggest that the estimate of 1880 has been misprinted, and should read  $140^\circ \pm, 30'' \pm$ .  
 64. Is  $\lambda$  271, in 1897 angle =  $152^\circ$ . P.m. =  $0''.03$  towards  $225^\circ$ .  
 65. Com. prop. mot. of  $0''.09$  towards  $257^\circ.5$ .  
 66. Distance in 1900 to read  $1''.35$ . Colours slightly contrasted.  
 67. P.m. =  $\alpha - 0.004$  sec.,  $\delta - 0''.10$ .  
 68. The changes indicated by Prof. See's measures in 1896 are not confirmed. For A-B the micrometer was set to  $331^\circ.8$  (Prof. See's angle), but the disagreement was very evident. Prof. See also measured the chief star as a double ( $0''.6$ ) on two nights. It is now certainly single.  
 69. Elongation doubtful, still the star does not look single. The measures were fairly accordant (1897,  $361^\circ.3$ ,  $0''.2$ , See, *in*).  
 70. The comes D was added in 1897 by Professor See. Transferring the Cape measure to A we have for comparison:—

A-D, 1897.4	$86^\circ.1$	$55''.4$	See. <i>in</i> .
„ 1902.3	$84^\circ.4$	$49''.8$	Innes. <i>in</i> .

This change is exactly accounted for by the proper motion of the triple system A-B-C; hence D is not connected with the system.

71. Prop. mot. =  $\alpha + 0.001$ ,  $\delta - 0''.09$ .  
 72. It is unfortunate that only one night's obs. of this system could be procured both in 1900 and 1902. We have:

1900.72	$184^\circ.3$	$0''.51$
1902.51	$167^\circ.7$	$0''.44$

73. A  $12\frac{1}{2}$ -mag. comes at twice the distance.  
 74. Found by Mr. Clymer at Arequipa and kindly communicated by Prof. E. C. Pickering.  
 75. Suspected by Mr. Clymer. If double, certainly under  $0''.4$  if components are sensibly equal in mag. the star looks single.  
 76. This star is C.Z. xvii., 2739. Lac. 7437, mag. 7.5, is 46 secs. f.  
 77. Prop. mot. =  $\alpha - 0.008$ ,  $\delta - 0''.03$ .  
 78. „ „ =  $0''.26$  towards  $184^\circ.0$ .  
 79. Found with the 7-in. = Innes 429. Prop. mot. =  $0''.09$  towards  $257^\circ.5$ .  
 80. This pair, with two other stars, form an isolated rhomboid. There is no material for the determination of proper motion, but it cannot be large.  
 81. Found at the Transit-Circle = Cape 45.  
 82. Prop. mot. =  $0''.04$  towards  $194^\circ.0$ , in which the *h* companion probably shares.  
 83. This pair is under  $0''.4$  if double. Prof. See's third component was also invisible. There is a 13th-mag. star  $15''$  N. pr. not noticed by Prof. See.  
 84. Found in 1897 = Innes 430. There is a  $9^m$  star  $4^{\text{secs.}}$  pr.,  $1'.3$  S. Lac. 8406, mag. 68 is  $1^{\text{min.}}$  pr.

Dec. 1902.

*Star Results, 1902.*

87

No.

85. This fine pair has a com. prop. mot. of  $0''.1341$  towards  $245^{\circ}8$ . The measures are :—

1880.9	$97^{\circ}0$	$1''.07$	Russell.	<i>m.</i>
1890.7	$96^{\circ}0$	$1''.08$	Sellors.	1
1896.7	$99^{\circ}7$	$0''.78$	See.	3
1902.5	$83^{\circ}4$	$1''.31$	Innes.	2

On the occasion of the last measure the wire was purposely set at  $99^{\circ}$ , but it was impossible; query if in 1896, a misprint for  $89^{\circ}$ .

86. The close pair was estimated  $318^{\circ}$  and  $240^{\circ}$  on two occasions. Probably single at present.

87. Day. By Sir D. Gill.

88. Day.

89. Night.

H

Cometary Observations at the Liverpool Observatory. By W. E. Plummer, M.A

Observations of Comet b 1902 (Perrine).

Greenwich Mean Time of Observation.		No. of Comp.		Apparent R.A. of $\delta$ .		$\delta$ - $\star$ Decl. of $\delta$ .		No. Comp.		App. Decl. of $\delta$ .		Log. Factor of Parallax $\alpha$ .		Log. Factor of Parallax $\delta$ .		Star of Comp.	
h m s		m s		h m s		$\delta$ - $\star$ Ret.		h m s		$\delta$ - $\star$ Decl.		Log. Factor of Parallax $\alpha$ .		Log. Factor of Parallax $\delta$ .		Star of Comp.	
Sept.	3	10 22 50.4	35	-2 19.45	3 15 36.34	- 3 0.3	5	+35 37 15.2	-9.6345	0.7635	a						
		10 22 50.4	25	-3 35.69	3 15 36.40	- 3 1.7	5	+35 37 15.9	-9.6345	0.7635	b						
	4	10 27 46.0	16	-2 40.61	3 14 29.42	+ 3 27.7	5	+36 3 19.7	-9.6369	0.7615	c						
	5	10 2 35.1	20	- 0.49	3 13 15.95	- 1 4.4	5	+36 30 8.0	-9.6370	0.7774	d						
		10 2 35.1	20	+1 14.02	3 13 15.89	+ 1 47.2	5	+36 30 8.8	-9.6370	0.7774	e						
6	10 40 26.0	16	+2 47.41	3 11 50.32	+ 5 9.5	4	+36 59 26.9	-9.6412	0.7315	f							
8	10 2 16.9	20	-2 5.10	3 8 37.26	- 1 46.4	5	+37 59 57.8	-9.6477	0.7551	g							
18	10 4 31.2	15	+ 3.45	2 35 28.36	+ 1 25.2	6	+45 6 1.1	-9.6787	0.5948	h							
19	10 29 24.8	16	-2 29.10	2 29 22.18	- 4 10.9	5	+46 3 53.4	-9.6614	0.5173	i							
23	8 18 16.0	16	-2 41.71	1 56 28.92	+ 3 26.2	5	+50 14 1.2	-9.7388	0.6558	j							
24	8 2 0.3	15	+ 3.90	1 44 49.89	- 4 34.3	4	+51 22 43.3	-9.7485	0.6136	k							
25	7 47 10.9	15	+ 1.86	1 31 20.92	- 1 42.2	6	+52 31 55.2	-9.7592	0.5962	l							
26	7 30 30.1	16	-2 4.68	1 15 46.55	- 4 16.9	6	+53 39 46.7	-9.7677	0.5394	m							
28	9 3 20.1	16	- 6.79	0 34 55.64	-14 16.7	5	+55 46 2.9	-9.6530	0.9772	n							
Oct.	1	7 25 45.7	10	+2 43.07	23 15 18.99	- 6 39.9	3	+57 0 38.0	-9.6893	0.9654	o						
	2	7 31 16.3	15	+1 52.99	22 43 21.66	- 3 46.8	5	+56 34 14.9	-9.5900	0.6037	p						
	5	7 14 11.2	12	+5 3.24	21 8 49.92	+ 4 43.7	4	+51 41 55.9	-9.1762	0.5806	q						
		7 14 11.2	12	+4 32.89	21 8 50.25	+ 2 12.3	4	+51 41 58.0	-9.1762	0.5806	r						
	8	7 26 10.4	16	+ 27.43	19 54 30.45	- 20.8	5	+42 22 22.9	+8.8893	0.2304	s						
11	7 6 29.2	12	-1 7.84	19 5 21.88	- 6 52.7	3	+31 46 44.7	+9.1434	0.5592	t							

Sept. 3. The comet presents a well-marked condensation to which the observations refer. Sept. 8. The sky somewhat cloudy, but the comet fairly well seen. Sept. 18. Moonlight troublesome. Sept. 28. Connected with  $\alpha$  Cassiopeiae by means of an intermediate star; the observation not very satisfactory. Oct. 5. Sky hazy, comet faint; found with difficulty.